ehp

LESSON:

How Do You Spend Your Time?

Summary

Students read an article about how youth spend less time outdoors than in years past, which reduces their exposure to nature and may also reduce their interest in the natural sciences. Students then participate in a survey to assess how much time members of the class spend outdoors and use sampling principles to develop a sampling plan to conduct the survey on a larger scale.

Lesson Type

Experiment—Students collect, manipulate, and/or summarize data from an experiment or activity they conduct.

EHP Article

Wild Child: Guiding the Young Back to Nature
Environ Health Perspect 116:A436–A439 (2008)
http://www.ehponline.org/members/2008/116-10/spheres.html

Objectives

By the end of this lesson, students should be able to

- describe survey research methodology
- develop a sampling protocol
- analyze data using descriptive statistics
- graph data

Class Time

2–3 hours

Grade Level

High school, college

Subjects Addressed

Environmental Science, General Science, Social Studies

Aligning with Standards

SKILLS USED OR DEVELOPED

- Communication (note-taking—oral, written)
- Comprehension (listening, reading)
- Computation
- Critical thinking and response
- Experimentation (design, conduct, data analysis)
- Graphing
- Research

SPECIFIC CONTENT ADDRESSED

- Survey research
- Sampling principles
- Children's interaction with nature

NATIONAL SCIENCE EDUCATION STANDARDS MET

Science Content Standards

Unifying Concepts and Processes Standard

- Systems, order, and organization
- Change, constancy, and measurement
- Evidence, models, and explanation

Science as Inquiry Standard

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Life Science Standard

- Behavior of organisms

National Institute of Environmental Health Sciences

Science in Personal and Social Perspectives Standard
- Personal and community health
- Environmental quality
- Science and technology in local, national, and global challenges

History and Nature of Science Standard
- Science as a human endeavor
- Historical perspectives
- Nature of scientific knowledge

Prepping the Lesson (10–15 minutes)

INSTRUCTIONS
1. Download the *EHP* article "Wild Child: Guiding the Young Back to Nature" at http://www.ehponline.org/members/2008/116-10/spheres.html.
2. Review the Background Information, Instructions, Assessing the Lesson, and Student Instructions for this lesson.
3. Make copies of the Student Instructions and Student Survey.
4. Make an overhead transparency of the Tally Sheet.

MATERIALS
per student
- 1 copy of the article "Wild Child: Guiding the Young Back to Nature," preferably in color
- 1 copy of the Student Instructions
- 1 copy of the Student Survey found at the end of this lesson
- calculator
- graph paper

per class
- overhead transparency of the 2-page Tally Sheet found at the end of this lesson
- overhead projector
- computer with Internet access (1 per class or 1 per group)

VOCABULARY
- bias
- confidence interval
- confidence level
- fieldwork
- mean
- median
- mode
- nonprobability sampling
- nonresponder
- nonresponder bias
- population
- probability sampling
- random selection
- representative sample
- response rate
- response bias
- response rate
- sample
- sedentary
- selection bias
- survey
- survey research

BACKGROUND INFORMATION
Surveys are a social and scientific research tool used to collect information about large groups of people. Well-designed surveys are implemented in a way that limits sampling bias and represents sample sizes large enough to be reliable and consistent. Applications of surveys are wide ranging and can include epidemiology, marketing, product placement, elections, and exposure science within the environmental health sciences.

Surveys can have limitations. For example, respondents may answer untruthfully or not at all. Also, survey questions may elicit responses that do not accurately reflect a respondent's thoughts or feelings, although this can be minimized by pilot-testing the survey with a smaller sample of people. Survey developers can then revise the survey before it is administered to a large group.

Surveys can be conducted via questionnaires or interviews. Questionnaires may be administered verbally or in writing, in

person, through the mail, or even online. Interviews may be conducted in person or via telephone. Typically, researchers administer a questionnaire to a sample of the population they are interested in studying and then analyze the results. This lesson focuses on a questionnaire-based survey.

Types of Questions

Written questionnaires usually have clear instructions and are short and easy to understand. Questionnaires typically include closed-ended questions, open-ended questions, or a mixture of both. Closed-ended questions limit participant responses to a list of answers provided on the survey. Choices can be dichotomous, such as "true/false" or "yes/no." Respondents may also be given multiple choices from which they can select only one answer. A common multiple-choice question uses a Likert-type scale, meaning respondents indicate how much they agree or disagree with a statement; choices typically include "strongly agree," "agree," "neutral," "disagree," and "strongly disagree." Closed-ended questions provide a more uniform response and can allow quantitative analysis by the investigator, because all respondents must select from the same list of options, and each response can be assigned a number or value, which can be quickly entered into a database and analyzed.

Open-ended questions do not provide a set of responses. Rather, respondents are asked to provide answers in their own words. For example, an open-ended question might be "What is your favorite type of ice cream? Write your answer below." Open-ended questions are useful because they do not limit participant responses, and they allow researchers to gain a better understanding of respondents' true feelings and attitudes.

Both types of questions have limitations. Closed-ended questions provide limited sets of responses, none of which may match a respondent's thoughts or feelings. For example, if the question "What is your favorite flavor of ice cream?" lists only "chocolate" and "vanilla" as possible answers, those whose favorite flavor is strawberry cannot accurately respond or must skip this question entirely (researchers can avoid this limitation by providing a third option—"other"—and asking respondents to fill in a blank). Open-ended questions, on the other hand, are not as easily analyzed as closed-ended ones, and responses may be easily misinterpreted by the researcher.

Reliability and Validity

Reliability and validity are two key concepts of survey research. Reliability is the extent to which any measuring tool provides the same result multiple times. For example, suppose you want to purchase a new bathroom scale. You decide to test two scales at the store by weighing yourself three times on each scale. The first scale gives you one answer on the first try, then adds 2 pounds to your weight on the second try. On the third try, the scale adds 5 pounds to your weight. The second scale gives the same weight all three times. You are more likely to purchase the second scale because it has consistently given you the same weight, which makes it a more reliable measuring tool. Similarly, researchers need to ensure their surveys are reliable in gathering consistent information from respondents. An unreliable survey is of little value, as it is very difficult for researchers to analyze the results and obtain an answer to a research question if the answers are different each time someone takes the questionnaire. Researchers use a variety of methods to check reliability, such as the test–retest method, in which a questionnaire is given to the same group of people multiple times. The more similar the test–retest results, the more reliable the questionnaire.

Validity is the accuracy with which a questionnaire measures what it is supposed to assess. Consider the bathroom scale example described previously. Suppose one scale gives your correct weight consistently (indicating reliability), whereas a second scale consistently subtracts 5 pounds from your correct weight (also indicating reliability). Although you might want to purchase the second scale for various reasons, such as the design or cost of the scale, the first scale is more accurate, or valid. Researchers use a variety of methods to assess validity, such as comparing one measure with another measure already determined to be valid.

Ideally, a study uses measurement tools that are both reliable and valid. However, achieving both reliability and validity can be difficult. Surveys generally are more reliable than they are valid. Questionnaires will be more reliable if they ask standardized questions. However, the emphasis on standardization may reduce a survey's validity if the questions do not adequately extract the information you seek.

Response Rates

Another important concern in survey research is a survey's response rate—the percentage of people who respond to the survey divided by the total number of people who received it. For example, if a researcher sends a survey to 100 people but receives only 20 responses, then the response rate can be calculated as 20/100 = 0.20 × 100%, for a response rate of 20%. Researchers want high response rates for their survey research. Low response rates may indicate problems with the study design and may introduce response bias (e.g., only young people respond, whose opinions or responses may differ from those of older members of the sample population). Low response rates may occur for any number of reasons, ranging from problems with the survey itself (e.g., the survey is overly complicated or questions are written in a manner that only one segment of the population understands), to the packaging in which the survey is sent or how an interviewer introduces himself, to the sample population selected, to the number of surveys sent out.

Several methods can be used to ensure enough responses are collected for a study, including sending questionnaires to considerably more people than are needed (the Student Instructions provide more information on sampling), sending multiple copies of a survey to study subjects, and even offering money or other incentives for responding. However, researchers must be careful when using incentives in survey research as this could cause problems with bias and/or credibility of the responses.

Reference

Babbie E. 2004. The Practice of Social Research. 10th ed. Belmont, CA: Wadsworth/Thomson Learning.

RESOURCES

Environmental Health Perspectives, Environews by Topic page. http://ehp.niehs.nih.gov/. Choose Research Issues and Initiatives

Surveys

Colorado State University. Writing Guides: Survey Research. An overview of survey-based research. http://writing.colostate.edu/guides/research/survey/index.cfm

Creative Research Systems. Sample Size Calculator. Online calculator determines how many people you need to survey to get the most precise research results. http://www.surveysystem.com/sscalc.htm

University of Chicago, National Opinion Research Center. What Is a Survey? Online booklet intended as an introduction to survey research. http://www.whatisasurvey.info/

Children's exposure to nature

National Environmental Education Foundation. Children's Health and Nature Fact Sheet. http://www.neefusa.org/assets/files/NIFactSheet.pdf

National Heart, Lung, and Blood Institute. We Can! Wean the Screen. Provides information about reducing screen time and increasing physical activity. http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/live-it/wean.htm

National Park Service. NPS homepage. Find National Parks near you and explore teacher curricula and data sets. http://www.nps.gov/

Implementing the Lesson

INSTRUCTIONS

1. Have students complete Step 1 of the Student Instructions individually. Allow students enough time to answer all the questions. Discuss student responses as a class.

Class Survey

2. Ask students if they are familiar with surveys. Students may have seen survey results in the news or online.
3. Instruct the students to read the information in Step 2. Distribute the Student Survey, and ask students to complete it as best they can.
4. Collect the surveys and divide the class into small groups of 3 to 5 students each. Have students complete Step 3 as a group. While students complete Step 3, quickly tabulate the survey data using the Tally Sheet overhead transparency.
5. Display the completed Tally Sheet on the overhead projector. Have students complete Step 4 individually.
6. Assign each group of students one to two survey questions to analyze. Have students complete Steps 5 and 6 as a group, then have them share their graphs and analyses with the rest of the class.
7. Distribute the article to the students and have them complete Steps 7 through 9 individually.

Sample Population Survey

8. Have students complete Steps 10 through 12 individually. For Step 12, direct students to the online sample size calculator at http://www.surveysystem.com/sscalc.htm#one. You can project the website using the overhead projector for the whole class to see or have each group use a computer with Internet access.

Notes & Helpful Hints

- For an additional activity, students may carry out their sampling protocol and conduct the survey with a larger number of students. Before starting this additional activity, be sure to investigate any data collection restrictions or requirements within the school, the district, or college/university. If data are not going to be shared publicly and are used for instructional purposes only, most research activities are exempt.
- To make the lesson more challenging, students can create their own survey.
- The survey results can be tallied using a spreadsheet in Microsoft Excel.
- If you teach multiple classes, have students compare data across multiple classes.
- Students can analyze multiple variables. For example, students can evaluate how students spend their time according to gender to see if responses differ between boys and girls.
- Students can write and present research reports on how much time young people spend in front of television, video game, and computer screens ("screen time") and/or the relationship between screen time and health outcomes such as obesity.
- Students can write and present research reports on famous naturalists or environmental scientists, such as Rachel Carson.
- Students can create posters encouraging classmates to spend more time outside or describing ways to reduce screen time.

Assessing the Lesson (steps not requiring teacher feedback are not listed below; see Student Instructions for complete step-by-step instructions)

Step 1 **Answer the following questions about spending time outdoors. a) Do you spend any time outdoors for fun? Why or why not? b) When you are outdoors, what is the environment like? Are there woods? Is it a beach? A desert? A city? c) Are there animals? What kind? d) Have you ever been camping? Hiking in nature? Why or why not? e) How do you feel when you spend time outdoors? f) Do you think others your age spend more or less time outdoors than teenagers in the past? Why or why not?**

Answers will vary; look for thoughtful, complete responses.

Step 3 **While your teacher is recording the class data on the Tally Sheet, form small groups and discuss whether you think the survey needs to be changed in any way. Take notes on your suggested changes and be prepared to discuss them with the class. Use the following questions as a guide. a) What was the main idea of the survey? What information did it obtain? b) Is there any information it should have obtained but missed? c) Were there any confusing or unclear questions in the survey? d) Did the order of the questions make sense? e) Did any of the questions provide information that ultimately was not very useful?**

Answers will vary; look for thoughtful, complete responses.

Step 4 **Examine the class data and answer the questions below as a group, showing your work. a) What is the mean age of respondents in your class? The median? The mode? b) What percentage of the class is male? Female?**

Look for complete, accurate calculations.

Step 5 **On graph paper create a bar graph of the class data for the survey question(s) assigned to your group by your teacher. Include a title for the graph, and label all axes. Present your results to the class.**

Graphs will vary, but they should be clear, well organized, and appropriately labeled with the independent variable (the question) on the *x*-axis and the dependent variable (percentage or number of students) on the *y*-axis.

Step 6 **Summarize the class results in 3 to 5 sentences below, answering the following questions. a) Do students spend time outdoors for fun? b) Do students value time spent outdoors for fun? c) Is time spent outdoors structured or unstructured? d) Based on the class data, do your observations support your predictions from Step 1f?**

Answers will vary; look for complete, accurate, and thoughtful observations.

Step 8 **a. According to the article, what are two potential broader implications of young people not interacting with nature?**

- In the future there may be fewer environmental health scientists/professionals.
- People's attitudes toward the natural world may change.
- People's attitudes toward environmental science/policy may change.

b. Summarize the article's hypothesis about the difference in how young people respond to structured versus unstructured time in nature.

According to the article, researchers have observed that if young people spend more unstructured time in nature, they may be more likely to have positive attitudes toward the natural world. Conversely, they have observed that if young people spend more "structured" time in nature, they may be more likely to have negative attitudes.

c. Summarize the evidence presented in the article about the potential health benefits of being in or near nature.

- Decreased stress levels
- Decreased heart rates
- Increased healing rates
- More effective treatment of children with attention deficit/hyperactivity disorder.
- Increased benefits from exercise

Step 9 **Now that you have taken the Student Survey, analyzed the data, and read the article about young people and the outdoors, are there any additional changes you would make to the survey? List examples of changes and briefly summarize why you would make the changes.**

Answers will vary; look for clearly written examples and logical explanations.

Step 10 **One of the most important elements of conducting survey research is a large sample. Why do you think it is important to survey a large sample of students (for instance, many students from different schools) rather than a small sample, such as your class?**

Student answers will vary; look for logical, accurate answers. Students with less experience in conducting scientific experiments/surveys or with statistics may provide simple answers such as "a larger sample provides more information/ opinions than a smaller sample." Students with more science or statistics experience may note that a larger sample is more likely to be representative than a smaller sample of a population.

Step 11 **a. Decide who your target population will be (characteristics of the population) for the larger-scale "outdoor activity" Student Survey. Describe the target population, and tell why you selected that population.**

Students' target populations will vary; look for logical explanations as to why they chose a population.

b. Estimate the number of people in the population. Tell how you reached that number. Show calculations if needed.

Student estimates will vary. Look for logical estimates and sufficient information to show how they reached that estimate.

Step 12 **a. Go to the sample size calculator at http://www.surveysystem.com/sscalc.htm and follow the instructions below to calculate sample sizes.**

iv. Select "Calculate." Play with different confidence intervals to see how the sample size changes. Once you decide on a confidence interval, list the confidence interval and the sample size needed.

Confidence intervals and sample sizes will vary; check for consistency. As a reference, to get a confidence interval of ± 2 with a very large or unknown population will require a sample size of 2,401.

v. **Now change the confidence level to 99%, but keep all other values the same. What is your sample size?**

Sample sizes will vary but should be larger than the value in the previous calculation.

vi. **What are the differences between using a 95% and a 99% confidence level? Summarize your observations.**

When all other values (population size and confidence interval) are the same, students should indicate that achieving a 99% confidence level requires a larger sample size than achieving a 95% confidence level.

vii. **If you assume you will have only a 20% response rate, how many surveys would you need to send out or conduct to attain the sample size required for a 95% confidence level? Show your calculations.**

Student answers will vary, but they should show their work so it can be checked. A sample is provided below.

If the students calculated they would need 1,000 samples:

80% of 1,000 = 800

1,000 + 800 = 1,800 surveys that would need to be sent out/conducted to attain the requisite 1,000

b. **Decide how you are going to choose your survey sample and minimize bias. Describe your sampling procedure below and justify why you chose that procedure.**

Sampling procedures will vary but should address the following points: confidence interval; confidence level; sample size; the number of surveys needed to send out or give to reach that sample size; whether probability or nonprobability sampling will be used and why; how survey results will be collected; and how bias will be minimized.

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Give us your feedback! Send comments about this lesson to ehpscienceed@niehs.nih.gov.

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How Do You Spend Your Time?

Step 1 Answer the following questions about spending time outdoors.

a. Do you spend any time outdoors for fun? Why or why not?

b. When you are outdoors, what is the environment like? Are there woods? Is it a beach? A desert? A city?

c. Are there animals? What kind?

d. Have you ever been camping? Hiking in nature? Why or why not?

e. How do you feel when you spend time outdoors?

f. Do you think others your age spend more or less time outdoors than teenagers in the past? Why or why not?

National Institute of Environmental Health Sciences

Class Survey: You and your classmates will complete a survey to see how much time students in your class spend outdoors for fun, then analyze the results.

Step 2 Surveys are a social and scientific research tool used to collect information on large groups of people. Surveys may describe a population's attitudes, opinions, or practices. Your class will first take the survey to pilot-test the questionnaire and to practice analyzing the data. Pilot-testing the survey and analyzing the data will help you determine whether the survey needs to be changed (for instance, is a question unclear or poorly worded? Is the order of the questions logical? Does the survey obtain the information it's meant to obtain?). Complete the Student Survey your teacher gives you. Your teacher will copy the class responses onto a Tally Sheet so you can analyze the "raw" data. This also keeps the responses anonymous.

Step 3 While your teacher is recording the class data on the Tally Sheet, form small groups and discuss whether you think the survey needs to be changed in any way. Take notes on your suggested changes, and be prepared to discuss them with the class. Use the following questions as a guide.

a. What was the main idea of the survey? What information did it obtain?

b. Is there any information it should have obtained but missed?

c. Were there any confusing or unclear questions in the survey?

d. Did the order of the questions make sense?

e. Did any of the questions provide information that ultimately was not very useful?

National Institute of Environmental Health Sciences

Step 4 Examine the class data and answer the questions below, showing your work.

a. What is the mean age of respondents in your class? The median? The mode?

b. What percentage of the class is male? Female?

Step 5 On graph paper create a bar graph of the class data for the survey question(s) assigned to your group by your teacher. Include a title for the graph, and label all axes. Present your results to the class.

Step 6 Summarize your class results in 3 to 5 sentences, answering the following questions.

a. Do students spend time outdoors for fun?

b. Do students value time spent outdoors for fun?

c. Is time spent outdoors structured or unstructured?

d. Based on your class data, do your observations support your predictions from Step 1f?

Step 7 Read the article "Wild Child: Guiding the Young Back to Nature."

Step 8 Refer to the article to answer the following questions.

a. According to the article, what are two potential broader implications of young people not interacting with nature?

b. Summarize the article's hypothesis about the difference in how young people respond to structured versus unstructured time in nature.

c. Summarize the evidence presented in the article about the potential health benefits of being in or near nature.

Step 9 Now that you have taken the survey, analyzed the data, and read the article about young people and the outdoors, are there any additional changes you would make to the Student Survey? List examples of changes and briefly summarize why you would make the changes.

Sample Population Survey: By taking the survey and suggesting changes, you have completed an important stage of survey development. Now you will create a plan for conducting the Student Survey on a larger scale with a sample population of other students.

Step 10 One of the most important elements of conducting survey research is a large sample. Why do you think it is important to survey a large sample of students (for instance, many students from different schools) rather than a small sample such as your class?

Step 11 Read the following information about study populations and samples, then answer the questions that follow.

A *population* is the entire group you wish to study. For example, if a researcher wants to know the favorite ice cream flavor of tenth-grade students in the United States, then the study population would be all U.S. tenth graders. A s*ample* is a small section of the target population. For example, 1,000 tenth-grade students from across the country would be a sample of the target population. It is very important to have a *representative sample* that reflects the characteristics of the whole population. For example, if the target population is 50% female, the sample also should be 50% female. A sample that is not representative is *biased*, or not accurate (for example, if the sample is 80% male, and males were more likely than females to strongly prefer vanilla ice cream, then one might incorrectly conclude that vanilla is the favorite flavor of ice cream among all tenth-grade students).

Bias can be introduced in several ways. *Selection bias* occurs when your sample is not representative of your target population. For instance, if you ask only your friends about their ice cream preferences, you have a biased sample because your friends likely are not representative of all students in your grade. *Nonresponder bias* occurs when people who do not respond differ from respondents in ways important to the study—for example, nonresponders might not eat ice cream. *Response bias* occurs when responders give wrong answers either deliberately or because they do not remember or know the correct answer. Bias can be minimized by carefully designing and implementing a research study as well as the study questionnaire.

a. Decide who your target population will be (characteristics of the population) for the larger-scale "outdoor activity" Student Survey. Describe the population, and tell why you selected that population.

b. Estimate the number of people in the population. Tell how you reached that number. Show calculations if needed.

Step 12 Because surveying everyone in a target population is not practical, you need to decide how you will sample the population. Read the following information about sampling, and answer the questions that follow.

Types of Sampling

There are two types of sampling: probability and nonprobability. *Probability sampling* is the preferred method because it typically results in more representative and less biased samples. Probability samples are identified based on *random selection*, in which each person in the population has an equal chance of being selected, independent of any other selections. Random selection also minimizes any potential selection bias and results in a more accurate estimate of the variable of interest.

To obtain a random sample for the ice cream study, we would need a list of all tenth-grade students in the United States. Each student would be assigned a number from 1 to *x*, with *x* being the total number of students. A random number table or generator could then be used to identify students for the sample. For instance, if the random number generator provided the number "42," then student number 42 would be selected for the sample. This process would continue until the sample included the desired total number of students. It is important to note that any measures obtained from a probability sample provide only an estimate of the actual measure. To obtain the true value of U.S. tenth-grade students' ice cream preferences, we would need to ask all tenth graders, which is not very practical.

Nonprobability sampling involves selecting participants in a way that does not involve probability theory or random selection. Examples of nonprobability sampling include questioning people in a mall or only your friends. Nonprobability sampling is often easier to conduct but is not as representative and thus is more prone to bias than probability sampling.

Sample Size

The closer the sample size is to the true population, the more accurate the survey result. There is a point at which your sample size is large enough for you to obtain a reasonably accurate representation of the preferences/actions of a population without having to question every person in that population, which would be expensive and time consuming. For example, if we know there are 10,000 tenth-grade students in the United States, then a sample of 50 would not be large enough to accurately reflect trends in the whole population. However, a sample of 5,000 or even 1,000 would provide a better estimate of students' preferences.

Scientists use statistics to help them determine a reasonable sample size and then increase the sample number to accommodate nonresponders. For example, if researchers determined the necessary sample size was 1,000 people, and the typical response rate for a mail survey was 20% (in other words, 20% of the people who received the survey actually responded), they would need to send out 5,000 surveys to obtain 1,000 responses.

Two important concepts for determining sample size are confidence intervals and confidence levels. A confidence interval is a range of values that is expected to contain the true population value. If 47% of respondents say they prefer chocolate ice cream and the confidence interval is 7%, then the estimate of how many people truly prefer chocolate ice cream is 47% ± 7%, for a range of 40–54%. There is an inverse relationship between sample size and confidence intervals: The larger the sample size, the smaller the confidence interval will be and the more representative the findings to the study population. So, let's say an initial study was done that had a confidence interval of ± 7%, as described above. Then a larger study (that is, with a larger sample size) was completed, and it reduced the confidence interval to ± 4%. Now we have a more precise estimate of how many people really prefer chocolate ice cream: 47% ± 4%, for a range of 43–51%.

The confidence level represents how likely it is that a sample will provide a good estimate of the true percentage of the target population that would pick a certain response (in this case, chocolate ice cream). Most researchers use confidence levels of 95% or 99%. In the example above, we used a 95% confidence level to estimate a confidence interval of 43–51%. This means that a range of 43–51% would include the true value 95% of the time if random variation (chance) was the only source of error.

a. The Internet has useful calculators to help people determine sample sizes for different studies. Go to the sample size calculator at http://www.surveysystem.com/sscalc.htm and follow the instructions below to calculate sample sizes.
   i. Select a confidence level of 95%.
   ii. Type in the size of the confidence interval you want. Remember, a smaller confidence interval (for instance, fewer than 3 percentage points) provides a better estimate of your target population.
   iii. Type in the size of your target population. For instance, if your target population is all students in your school, type in the total number of students. If the target population is very large or unknown, leave this box blank.

iv. Select "Calculate." Play with different confidence intervals to see how the sample size changes. Once you decide on a confidence interval, list your confidence interval and the sample size needed.

v. Now change the confidence level to 99%, but keep all other values the same. What is your sample size?

vi. What are the differences between using a 95% or 99% confidence level? Summarize your observations.

vii. If you assume that you will have only a 20% response rate, how many surveys would you need to send out or conduct to attain the sample size required for a 95% confidence level? Show your calculations.

b. Decide how you are going to choose your survey sample and minimize bias. Describe your sampling procedure below, and justify why you chose that procedure. Your sampling procedure should include the following:
   - What is your study's confidence interval? Confidence level? Sample size? The number of surveys you would need to send out or give to reach that sample size?
   - Will you use probability or nonprobability sampling? Why?
   - How will you collect your sample (e.g., mail, online, phone interviews, in-person interviews)?
   - How do you plan to minimize bias?

Student Survey

Please answer the questions below. Each question is optional. Please do not put your name on this survey. This information will be kept confidential.

1. How old are you? _____

2. What is your gender?
   Male _____ Female _____

3. In the past year, have you spent any unstructured time outside for fun?
   Yes _____ No _____

4. In the past year, have you participated in an organized or educational outdoor program?
   Yes _____ No _____

5. About how many hours do you spend on the computer, watch TV, play video games, or participate in other forms of screen time? Round to the nearest whole hour.
   On a typical weekday _____ On a typical weekend day _____

6. About how many hours do you spend outside for fun? Round to the nearest whole hour.
   On a typical weekday _____ On a typical weekend day _____

7. List the top three activities you like to do outside for fun:

   a.

   b.

   c.

For questions 8–12, circle the statement that best matches with your opinion.

8. I think it is important to spend time outside just for fun.
   Strongly agree Agree Neutral Disagree Strongly disagree

9. I enjoy spending time outside for fun.
   Strongly agree Agree Neutral Disagree Strongly disagree

10. Spending time outside makes me feel connected with nature.
    Strongly agree Agree Neutral Disagree Strongly disagree

11. My parents/guardians encourage me to spend time outside for fun.
    Strongly agree Agree Neutral Disagree Strongly disagree

12. I spend time outside for fun because I want to.
    Strongly agree Agree Neutral Disagree Strongly disagree

Tally Sheet

	Mean	Median	Mode
1. Age			

	Number of Responses	Percentage (%)
2. Male		
Female		
Total		
3. Yes		
No		
Total		
4. Yes		
No		
Total		
5. Weekday		
Weekend day		
Total		
6. Weekday		
Weekend day		
Total		
7. Activity (list below)		
Total		

	Number of Responses	Percentage (%)
7. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		
8. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		
9. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		
10. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		
11. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		
12. Strongly Agree		
Agree		
Neutral		
Disagree		
Strongly Disagree		
Total		